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What is Nanotechnology?

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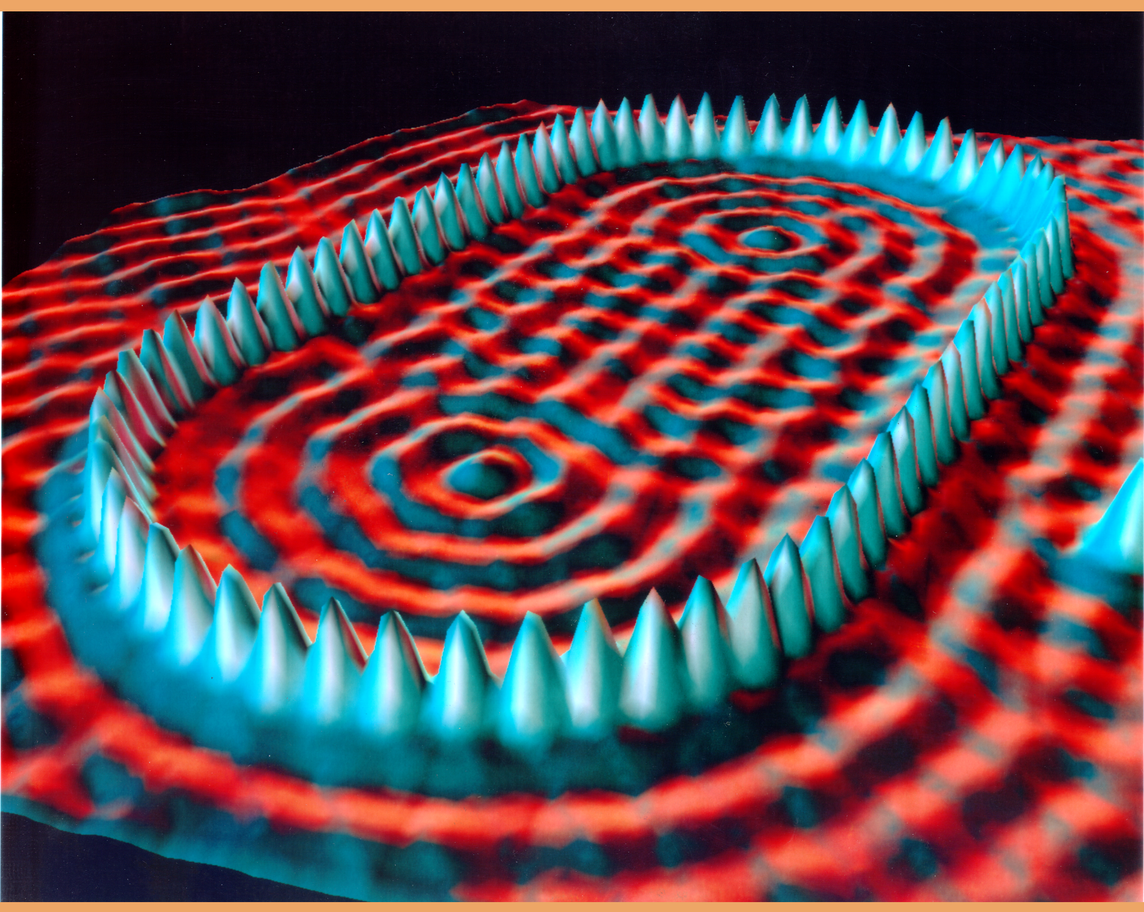

Stadium Corral. *From M.F. Crommie, C.P. Lutz, D.M. Eigler. "Confinement of electrons to quantum corrals on a metal surface." Science 262, 218-220 (1993). Reprinted with permission from AAAS. Image courtesy of Michael Crommie, Christopher Lutz, and Donald Eigler, IBM Almaden Research Center.*

WHAT IS NANOTECHNOLOGY?

The definition of nanotechnology — as a word or description of a research field — is still evolving. The root definition embraces work conducted at a scale between one and one hundred nanometers. A broader definition is the manipulation of matter at the molecular level. Researchers in chemistry, biology, physics, and material science are all investigating how particles behave at the nanoscale, each working to define this emerging field.

It is extremely difficult for most people to imagine how tiny a nanometer is. One nanometer equals one millionth of a millimeter, or 10^{-9}m. That is equivalent to about ten times the diameter of a hydrogen atom, the length your fingernails grow each second, or the thickness of a single drop of water spread over one square meter.

Because particles act unexpectedly at the nanoscale, images are critical, but they are also problematic. Nanoparticles are smaller than visible light waves. Even color does not transmit at the nanoscale. Scientists must depend and rely on computer-generated graphics to visualize their data. Imagination, science, and art intersect in the field of nanotechnology.